A FLAGELLATED HELIOZOAN.

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In some water taken from the pond in the Botanical Gardens at the University of Pennsylvania, in August, 1899, the two Heliozoa here figured were found.

Of these, that shown in Fig. 1 possessed a typical heliozoan body of foamy protoplasm. There was a clear, colorless outer layer, while the central portion consisted of an aggregation of small spherical bodies, greenish, reddish, and yellowish in color. The nucleus was invisible, and a contractile vacuole was not observed.

The most striking feature of the animal was the pseudopodia. These were of two kinds. The longer closely resembled those of Actinophrys. They projected in a more or less radial direction and showed considerable freedom of movement, frequently sweeping through large arcs. They always, however, preserved their straightness. At different times they varied greatly in length, and were often wholly withdrawn.

The shorter pseudopodia were extremely delicate strands of protoplasm that projected radially from the surface of the animal. The outer end of each of these was modified in such a way as to render it more conspicuous, but I was not able to determine the exact nature of this modification. In the specimens that were observed, the entire system moved in concert, the movement consisting in an alternate lengthening and shortening of the pseudopodia. Fig. 1 shows them at the greatest length that I observed. In such cases the spherical body of the animal appeared as if inclosed by a definite ring. At other times these pseudopodia were wholly withdrawn.

The animal was highly polymorphic, and occasionally, when all the pseudopodia of both kinds were drawn in, its shape departed so far from the spherical that it might have been taken for a sluggish Amœba.

On account of the clear cortical layer, the color of the central mass, the two kinds of pseudopodia and the nature of their movements, and the invisibility of the nucleus, the animal bears a close resemblance to *Vampyrella lateritia*, as described by Leidy ("The Fresh-Water Rhizopods of North America," *U. S. Geol. Sur.*, Vol. XII, Washington, 1879). There is a discrepancy in the nature of the terminal modifications of the shorter pseudopodia. Leidy states that these resemble the head of a pin, which was not the case in the

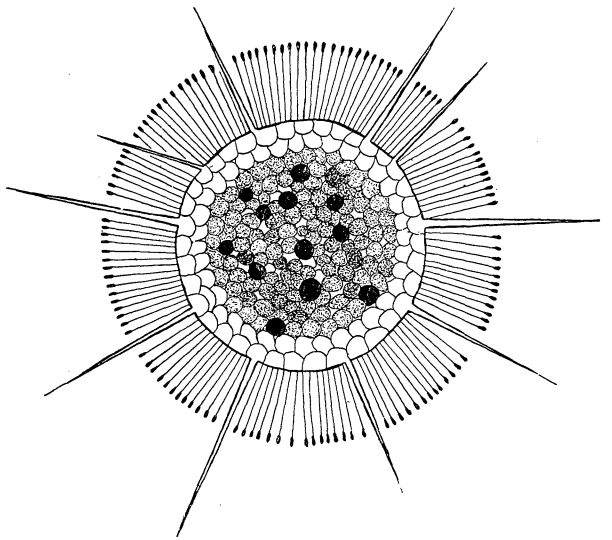

FIG. 1.

animal that I found. Nevertheless, the appearances tally so closely in all other respects that it may be referred to that genus.

The second heliozoan, shown in Fig. 2, was exactly like the first in all respects but one. The size, 80 μ in diameter, was the same. The long pseudopodia were identical in both animals, and the bodies, with their clear cortices and colored central masses, wholly alike. The difference consisted in the fact that the short pseudopodia of the form shown in Fig. 1 were represented in the other by a mantle of flagella. This whole system moved in unison, but the movement of each individual proto-

plasmic process was the lashing of a flagellum, and not the beating of a cilium.

While the spores of Heliozoa are in several cases flagellula, the possession of a series of flagella by the adult forms has been noted in but one other case. Eugène Penard ("Sur un heliozoaire nageur, Myriophrys paradoxa, *gen. nov., sp. nov.*," *Arch. Sci. Phys. et Nat.*, Tome IV, No. 9, pp. 285–289, Pl. III, 15 Septembre, 1897) describes a single individual which he

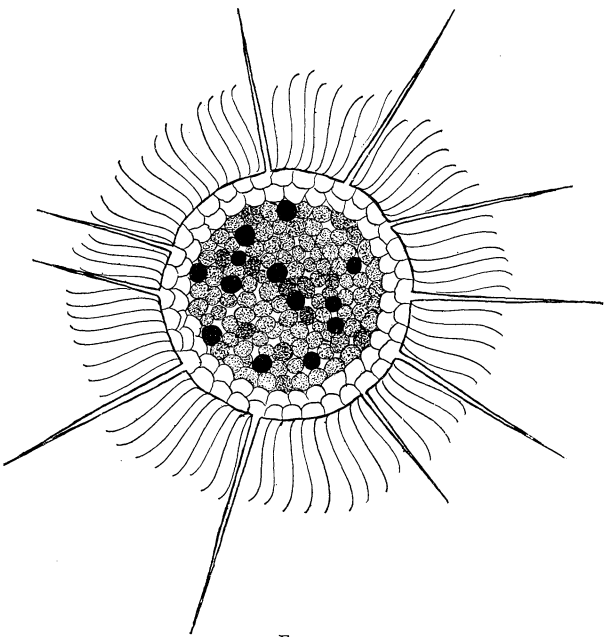

FIG. 2.

found in fresh water, also in August. This animal was about 40 μ in diameter. It was furnished with pseudopodia of the Acanthocystis type, and possessed an external skeletal layer beset with minute scales (*écailles*). There was a large contractile vacuole and an evident nucleus. It therefore will be seen that in several essential characters it differed wholly from the form here described. Concerning the flagella, Penard says: "On pourrait plutôt comparer ces cils à de petits flagellums, qui, par leur abondance, formeraient une véritable chevelure."

Penard considered the flagellated condition to be permanent,

and created for the organism a new genus and a new species. He saw, however, but one individual. I was more fortunate in that I found many individuals of the two kinds that I have figured.

It is known that a pseudopodium may turn into a flagellum, and, conversely, that a flagellum may turn into a pseudopodium. This, together with the fact that these two animals were identical in all respects but one, and that they occurred side by side in the same drop of water, renders it very probable that they are only different conditions of one and the same animal. There seems, then, no good reason for creating a new name, and I accordingly suggest retaining that used by Leidy, *Vampyrella lateritia*, even though the definition of this species must be somewhat enlarged.

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